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Do Both U.S. and Foreign Macro Surprises Matter for the Intraday Exchange Rate? Evidence from Japan

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Abstract: We investigate the effects of both U.S. and Japanese news surprises, measured as the difference between macroeconomic announcements and preceding survey expectations, on the intraday JPY/USD exchange rate. No previous study has considered the intraday JPY/USD exchange rate responses to a broad set of comparable news surprises from both the U.S. and Japan. We show that news surprises from Japan are as influential as those from the U.S. in moving 5-minute JPY/USD exchange rate returns and, therefore, focusing on U.S. news while disregarding foreign news misses half the story. Our results also show that distinguishing between positive and negative news surprises and the state of the Japanese business cycle is important in understanding the link between exchange rates and news.

Key words: Foreign Exchange Rates; Intraday Data; Macroeconomic News Effects

JEL Classifications: F31; G15; C22

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1. Introduction

This paper investigates the real-time (intraday) effects of U.S. and Japanese macroeconomic news surprises on the JPY/USD exchange rate over the 1 January 1999 to 31 October 2006 time-period. News data consisting of a large number of time-stamped U.S. and Japanese macroeconomic announcements and preceding survey expectations obtained from Bloomberg News Service, along with indicative 5-minute spot JPY/USD exchange rate quotes, facilitate our investigation. We show that news surprises from Japan are as influential as those from the U.S. in moving exchange rate returns. Our results suggest that focusing on U.S. news while disregarding foreign news misses half the story.

Recent research has demonstrated the importance of U.S. macroeconomic news surprises on the dynamics of intraday exchange rate movements, thereby reasserting the link between exchange rates and fundamentals and moving the empirical exchange rate literature forward beyond the concerns about the limits to exchange rate models first expressed by Meese and Rogoff (1983). This area of research offers important insights regarding how quickly exchange rate markets react to macro news and which macro news are essential for developing a better understanding of exchange rate movements (see, for example, Andersen, Bollerslev, Diebold and Vega, 2003 and 2007; Chaboud, Chernenko, Howorka, Iyer, Liu and Wright, 2004; and Faust, Rogers, Wang and Wright, 2005). Generally, these intraday exchange rate studies suggest that stronger than expected U.S. economic activity (or higher than expected inflation rates) tends to appreciate the USD, and, furthermore, that U.S. news produce conditional mean jumps in the exchange rate.[1]

[1] See Clarida and Waldman (2007) and Engel, Mark, and West (2007) for details on how expectations regarding central bank policy responses to inflation are formed.

Ito and Roley (1987) point out that "an analysis of the effects of news on exchange rates needs to be carried out with respect to the other country's news as well as U.S. news" (p. 257). A number of studies of the evolution of the USD vis-à-vis European currencies have jointly considered the intraday exchange rate responses to both U.S. and European macroeconomic news (see, for example, Almeida, Goodhart and Payne, 1998; Andersen, Bollerslev, Diebold and Vega, 2003; and Bauwens, Ben Omrane, and Giot, 2005). By contrast, studies of the intraday JPY/USD exchange rate effects of news have largely ignored the Japanese side of macro news and assessed only the influence of U.S. news. This is surprising, especially considering that the Japanese economy is the second-largest economy in the world, Japan has a flexible exchange rate system with open capital markets, and the JPY/USD exchange rate has experienced very substantial fluctuations.[2]

Exceptions that do take into account Japanese macro news when analyzing the intraday JPY/USD exchange rate include the contributions by Cai, Cheung, Lee and Melvin (2001), Clarida and Waldman (2007), Ito and Roley (1987), and Melvin and Yin (2000). None of these studies, however, consider a broad set of comparable Japanese and U.S. news surprises. Cai, Cheung, Lee and Melvin (2001) consider both U.S. and Japanese macro announcements, but do not incorporate survey expectations for disentangling the surprise component from the official announcement.[3] Clarida and Waldman (2007) focus on U.S. and Japanese inflation news surprises in order to identify the associated intraday central bank responses and, in turn, assess the impact on the

[2] Over the 1 January 1999 to 31 October 2006 sample period, the JPY on average depreciated only modestly against the USD but experienced considerable swings. To illustrate, the strength of the JPY peaked at 102 JPY/USD at the end of 1999, and the strength of the USD peaked at 135 JPY/USD in early 2002.

[3] In the context of daily exchange rates and monetary policy news, Fatum and Scholnick (2008) show that failure to disentangle the surprise component from the announcement leads to an underestimation of the impact of news.

exchange rate. They do not investigate the JPY/USD exchange rate response to U.S. and Japanese news surprises in general. Ito and Roley (1987), like Cai, Cheung, Lee and Melvin (2001), consider both U.S. and Japanese macro announcements, but only incorporate survey expectations for disentangling the surprise component from the official announcement regarding U.S. news.[4] Melvin and Yin (2000) investigate the intraday effects of the number of news headlines in the U.S. and Japan on the JPY/USD exchange rate, but do not consider news surprises.

No study to date has jointly considered the JPY/USD exchange rate responses to a broad set of comparable news surprises from both the U.S. and Japan. Our study addresses this issue by investigating the intraday JPY/USD exchange rate responses to U.S. and Japanese macroeconomic news surprises, where both U.S. and Japanese news surprises are measured as the difference between the macroeconomic announcement and the median value of the immediately preceding Bloomberg News Service survey of market expectations regarding the given announcement. We consider three key research questions. The first, of course, is whether both U.S. and Japanese macro news surprises influence the JPY/USD exchange rate, i.e. whether Japanese news matter and, if so, which Japanese news are important and how do their relative influence compare to the relative influence of U.S. news. The second research question is whether "good" and "bad" news exert symmetric intraday effects on the exchange rate, i.e. is the absolute magnitude of the exchange rate movement attributed to a positive (i.e. better than expected) Japanese GDP surprise the same as the absolute magnitude of the movement associated with a negative (i.e. worse than expected) Japanese GDP surprise. Our third

[4] As noted by Ito and Roley (1987, p. 264), survey data regarding Japanese macroeconomic announcements were not available when their study was carried out.

and final research question pertains to whether news have asymmetric exchange rate effects across different stages of the business cycle. Other studies, including McQueen and Roley (1993), suggest that the effect of news varies with the stages of the business cycle. Since our data set of macro news surprises for both the U.S. and Japan spans different combinations of U.S. and Japan business cycle upturns and downturns, we are able to shed light on whether business cycle asymmetries are present in our context.[5]

For our baseline estimations, we estimate the exchange rate response to news surprises using only observations within 10-minutes before and 90-minutes after each announcement. To accommodate the long memory and the intraday periodicity that characterize our intraday JPY/USD exchange rate data, we estimate our baseline models using heteroskedasticity and serial-correlation robust (HAC) standard errors. To ensure the robustness of our results we also carry out estimations that include all the observations in our sample and, furthermore, we re-estimate the baseline model using the two-step weighted least squares (2WLS) estimation.[6]

Our results show that both U.S. and Japanese news surprises matter for the intraday JPY/USD exchange rate and, in particular, the overall relative influences of U.S. and Japanese news are very similar. We find some evidence of symmetric effects across all positive and all negative Japanese news surprises, contrasting with some evidence of asymmetric effects across all positive and all negative U.S. news surprises. However, we find asymmetric effects across positive and negative Japanese news surprises when

[5] Using daily data, McQueen and Roley (1993) show that news regarding unexpectedly strong economic activity in the U.S. has a positive effect on the S&P 500 index when business conditions are weak, but a negative effect when business conditions are strong. They attribute this asymmetry to differences in the response of discount rates relative to expected cash flows given different states of the economy. They argue that studies not accounting for differences in the business cycle may lead to an underestimation of the effects of announcement surprises

[6] Our baseline estimation procedure follows Andersen, Bollerslev, Diebold and Vega (2007). The 2WLS estimation procedure is described in Andersen and Bollerslev (1998).

looking at the various types of Japanese news individually. Taking into account the stages of the business cycle of the U.S. and Japan we show that the intraday JPY/USD exchange rate responds to a broader set of both U.S. and Japanese news when the Japanese economy is in an upturn, yet it is even more responsive to the consistently most important types of both U.S. and Japanese news when the Japanese economy is in a downturn.

The following two sections discuss our data and our econometric methodology, respectively. Section 4 presents the baseline results and our methodological robustness checks. Section 5 extends the analysis to test for asymmetric effects of positive and negative surprises, and investigates whether the state of U.S. and Japanese business cycles impacts how the exchange rate responds to news. Section 6 concludes.

2. Data

The intraday JPY/USD exchange rate data is provided by Olsen and Associates, collected from commercial banks by Tenfore and Oanda, and covers the 1 January 1999 to 31 October 2006 time-period. The data consists of the bid and the offer spot exchange rate at the end of every 5-minute interval over every 24-hour period. The quotes are indicative quotes, i.e. not necessarily traded quotes. We filter the data for anomalies and bad quotes following the procedure of Dacorogna, Müller, Nagler, Olsen and Pictet (1993).

Our midpoint (log) exchange rate price at each 5-minute point is constructed by linearly interpolating the average of the preceding and immediately following (log) bid and offer quotes. The continuously compounded 5-minute returns (R_t) are calculated as

the change in the 5-minute midpoint prices.[7] Consistent with the existing intraday literature on widely traded currency pairs we define a trading day to start at 21.05 GMT the night before and end at 21.00 GMT on the evening of the trading day in question (see Bollerslev and Domowitz, 1993) and, furthermore, we define a weekend to start at 21.05 GMT Friday and finish at 21.00 GMT Sunday.

Our news data consists of a large number of time-stamped Japanese and U.S. macroeconomic announcements and preceding survey expectations obtained from Bloomberg News Service.[8] We include in our analysis Japanese news variables that are largely comparable to the U.S. news variables that are significant in either the time-series analysis or the event study analysis of Andersen, Bollerslev, Diebold and Vega (2003) in their investigation of the JPY/USD exchange rate. In addition, we consider surprises regarding Japanese news of particular interest, e.g. surprises regarding the Bank of Japan's TANKAN survey variables.[9] We include U.S. news variables that Andersen, Bollerslev, Diebold and Vega (2003) find to significantly influence the JPY/USD exchange rate, and we also take into account additional "usual suspects" variables such as surprises regarding U.S. consumer and producer price indices. Consequently, our data includes announcements and survey expectations regarding 16 types of Japanese macro news and 19 types of U.S. macro news. The Japanese news variables are GDP (quarterly), GDP (annual), Industrial Production, Capacity Utilization, Construction Orders, Overall Spending, Large Retail Sales, Trade Balance, Current Account, Retail

[7] Goodhart, Ito and Payne (1996) show that 5-minute returns constructed from indicative quotes closely resemble 5-minute returns constructed from transaction prices.

[8] Japanese macro announcements are available from Bloomberg News Service as well as from the data banks of the Bank of Japan and the Japanese Cabinet Office.

[9] The Bank of Japan website at www.boj.or.jp/en/theme/research/stat/tk/index.htm provides details (in English) regarding the TANKAN survey variables.

Trade, Consumer Price Index, Consumer Confidence Index, TANKAN Large Manufacturing Index, TANKAN Non-Manufacturing Index, Leading Economic Index, and Monetary Base. The U.S. news variables are GDP, Non-Farm Payroll Employment, Industrial Production, Capacity Utilization, Personal Income, Consumer Credit, Consumer Spending, New Home Sales, Durable Good Orders, Factory Orders, Business Inventories, Trade Balance, Producer Price Index, Consumer Price Index, Consumer Confidence Index, NAPM Index, Housing Starts, Index of Leading Indicators, and Target Federal Funds Rate.

Consistent with the recent literature on exchange rates and news, for each of the macroeconomic announcements in our data we define a news surprise as the difference between the macroeconomic announcement and the preceding survey expectation of that announcement. Subsequently, we standardize each news surprise series in order to allow for a comparison of the relative influences of different types of news.[10]

Table 1 displays details regarding the Japanese news surprises.[11] The table shows the number of non-zero news surprises, the announcement frequency, and the start date of each of the Japanese news variable series.[12]

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[10] A standardized news surprise is given by the unexpected component of the macroeconomic announcement divided by the associated sample standard deviation. Let $A_{q,t}$ denote the value of a given macroeconomic fundamental q, announced at time (minute) t. Let $E_{q,t}$ refer to the median value of the preceding market expectations for the given fundamental at announcement time t, and let $\hat{\sigma}_q$ denote the sample standard deviation of all the surprise components associated with fundamental q. The standardized surprise of macroeconomic fundamental q announced at time t is then defined as $S_{q,t} = \left(A_{q,t} - E_{q,t}\right) / \hat{\sigma}_q$.

[11] The Bank of Japan website at www.boj.or.jp/en/theme/stat/index.htm and the Japanese Cabinet Office website at www.cao.go.jp/index-e.html provide additional details (in English) regarding the Japanese macro announcements. Details regarding the U.S. news surprises are described in Andersen, Bollerslev, Diebold and Vega (2003, p. 43) and not shown here for brevity.

[12] Table 1 shows considerable variation in start dates across the Japanese news variables. A similar variation is found in the start dates across the U.S. news variables analyzed in Andersen, Bollerslev, Diebold and Vega (2003, p.43).

3. Econometric Methodology

We model the response of the 5-minute JPY/USD exchange rate return, R_t, as a linear function of J lagged values of the return itself and K lags of each of the Q news variables, $S_{q,t}$:

$$(1) \qquad R_t = \beta_0 + \sum_{j=1}^{J} \beta_j R_{t-j} + \sum_{q=1}^{Q} \sum_{k=0}^{K} \gamma_{q,k} S_{q,t-k} + \varepsilon_t \ , \ t = 1, \ldots, T$$

where T = 611,239, Q = 35 (19 U.S. and 16 Japanese news), and J and K are chosen according to the Schwarz Bayesian Information Criteria (SBIC).

We estimate Equation (1) using three different methodologies. For our baseline estimations, we only include observations within 10-minutes before and 90-minutes after each announcement. We estimate our baseline models using HAC standard errors, thus accommodating the long memory and the intraday periodicity that characterize our intraday JPY/USD exchange rate series.

The second methodology that we employ to estimate Equation (1) includes all observations in our sample. The objective is to ensure that limiting the sample to include only the 100-minute windows around the macro announcements does not affect the results. Finally, we employ the two-step weighted least squares (2WLS) estimation procedure. This approach enables us to directly estimate the volatility pattern of our data.

More specifically, in our WLS methodology, we first estimate Equation (1) by OLS and obtain the estimated residuals $\hat{\varepsilon}_t$. The next step is to model the volatility pattern using the absolute value of the estimated residuals of Equation (1). We follow Andersen, Bollerslev, Diebold and Vega (2007) and use the following parameterization:

$$(2) \qquad \left|\hat{\varepsilon}_t\right| = \sum_{i=1}^{I'} \beta_i \left|\hat{\varepsilon}_{t-i}\right| + \sum_{d=1}^{D} \gamma_d D_d + \sum_{q=1}^{Q} \sum_{j'=0}^{J'} \gamma_{q,j'} D_{q,t-j'} + u_t$$

where I' = 9 lags of the absolute value of the estimated residuals (accounting for serial correlation, or ARCH effects), D = 38 dummies capturing the well-documented intraday volatility pattern, and the last summation reflects dummy variables for each of the announcement surprises up to a lag length of J' = 14. In the last step, we use the fitted residuals from Equation (2) to perform a WLS estimation of Equation (1).

Comparing the WLS results to the results of our HAC baseline estimations ensures that there is no substantial precision lost in the coefficient estimates stemming from the baseline estimation procedure.

Subsequently, we extend our modeling framework by relaxing the linearity assumption in two ways. First, we allow for the possibility that positive surprises (i.e. better than expected economic news) have a different impact than negative surprises (i.e. worse than expected economic news). We test whether this is the case by first defining $S_{q,t}^{Pos} = S_{q,t}$ if $S_{q,t} \geq 0$ (and 0 otherwise), and $S_{q,t}^{Neg} = S_{q,t}$ if $S_{q,t} < 0$ (and 0 otherwise) and, in turn, estimating the following equation:

$$(3) \qquad R_t = \beta_0 + \sum_{j=1}^{J} \beta_j R_{t-j} + \sum_{q=1}^{Q} \sum_{k=0}^{K} \gamma_{q,k}^{Pos} S_{q,t-k}^{Pos} + \sum_{q=1}^{Q} \sum_{k=0}^{K} \gamma_{q,k}^{Neg} S_{q,t-k}^{Neg} + \varepsilon_t$$

where the superscripts Pos and Neg denote positive and negative surprises, respectively.

Second, we allow for the possibility that the effects of macro surprises are conditional on the stage of the business cycle, i.e. we assess whether macro surprises have asymmetric effects across different stages of the business cycle. To do so we first let

t_i for i = A, …, D denote each of the four possible business cycle combinations coincident for the U.S. and Japan as follows:

- t_A: Japan and U.S. upturn;
- t_B: Japan and U.S. downturn;
- t_C: Japan upturn and U.S. downturn;
- t_D: Japan downturn and U.S. upturn.

The timing of economic upturns and downturns for the U.S. follows the Business Cycle Dating Committee of the National Bureau of Economic Research. Business cycle dating for Japan is set in accordance with peaks and troughs of the Japanese industrial production index. Peaks (troughs) are identified as the highest (lowest) level of industrial production during an economic expansion (contraction).[13]

We then estimate the following equation:

$$(4) \qquad R_t = \beta_0 + \sum_{j=1}^{J} \beta_j R_{t-j} + \sum_{q=1}^{Q} \sum_{k=0}^{K} \gamma_{q,k} S_{q,t-k} + \varepsilon_t \text{ , for } t \in t_i \text{ and } i = \text{A, …, D.}$$

We estimate Equation (4) separately across the business cycle combinations during which we have a sufficient number of non-zero macro surprises to make the estimations meaningful.

4. Results

The first column of Table 2 displays the results of our baseline regression model described in Equation (1), including only observations within the 10-minute "windows"

[13] Japanese business cycles identified using the Japanese industrial production index correlate closely with business cycles identified using the Composite Coincident Business Cycle Index from the Government of Japan Cabinet Office ("Indexes of Business Conditions").

before and the 90-minute "windows" after each of the announcements and using HAC standard errors. We set $J = 2$ and $K = 0$ according to SBIC, i.e. we include as explanatory variables two lags of the exchange rate return and only the contemporaneous value of each of the 35 (19 U.S. and 16 Japanese) standardized news variables.

For the U.S. news variables our results show that 12 of the 19 variables are significant and of the correct sign. The magnitudes of the coefficient estimates show that news surprises regarding non-farm payroll employment and trade balance are the two most influential types of U.S. macro surprises. This is consistent with existing studies of U.S. macro surprises and the JPY/USD exchange rate. Furthermore, we find that a news surprise regarding GDP is the third most influential type of U.S. macro news. This is in contrast to, in particular, Andersen, Bollerslev, Diebold and Vega (2003) who detect no impact of U.S. GDP surprises on the JPY/USD exchange rate. However, given that our sample starts after theirs ends, it is not surprising to find some variation in the set of influential U.S. and Japanese macro news.[14]

Turning to the Japanese macro news estimates from our baseline model, Table 2 shows that 6 of the 16 Japanese macro news variables are significant and of the correct sign. The two most influential Japanese news surprises are news regarding Japanese GDP (annualized) and the TANKAN large manufacturing index. According to the magnitude of the estimated coefficients, these two types of Japanese news are less influential than news surprises regarding the two most influential types of U.S. news, but more influential than any other type of U.S. news, including news regarding U.S. GDP. Put differently, in order of economic importance the four most important news variables are U.S. non-farm

[14] Faust, Rogers, Wang and Wright (2005) discuss the time-dependence of macro news.

payroll employment, U.S. trade balance, Japanese GDP, and the Japanese TANKAN large manufacturing index.[15]

Figures 1 and 2 display the coefficient estimates from the baseline model associated with only the significant news variables for the U.S. and Japan, respectively.[16]

To get a sense of the relative influence of broad categories of U.S. and Japanese news, we group our news variables into seven categories: GDP, real activity (RA), consumption (CONS), investment (INV), net exports (NETEX), prices (P), forward looking (FL), and monetary news (M)[17]. Figure 3 shows the average news effect for each category. The average news effect is the simple average of the significant coefficient estimates within each news category. U.S. and Japanese GDP news, consumption news (CONS) and price news (PA) have very similar average impacts on the exchange rate. Real activity news (RA), investment news (INV) and net export news (NETEX) play a much more important role when emanating from the U.S. By contrast, forward looking news (FL) play the dominant role when emanating from Japan. This comparison of the

[15] Andersen, Bollerslev, Diebold and Vega (2003) conjecture that their generally insignificant results regarding the influence of German news surprises on the intraday DEM/USD exchange rate may be attributable to the "uncertain", i.e. not pre-scheduled, release time of German macro announcements. By contrast, the exact timing of Japanese announcements is mostly predictable. Consequently, our significant results regarding the influence of Japanese news surprises lend some credibility to this conjecture.

[16] To ease the comparison of the effects of U.S. and Japanese news surprises, the coefficient estimates associated with the Japanese news in Figure 2 are multiplied by negative one.

[17] The groupings are as follows. GDP consists, obviously, of news regarding GDP for both the U.S. and Japan. RA consists of non-farm payroll, industrial production, capacity utilization, personal income, and consumer credit for the U.S., and large retail sales, industrial production and capacity utilization for Japan. CONS consists of consumer spending and new home sales for the U.S., and overall spending for Japan. INV consists of durable goods orders, factory orders, and business inventories for the U.S., and construction orders for Japan. NETEX consists of trade balance for the U.S., and trade balance, current account and retail trade for Japan. P consists of producer price index and consumer price index for the U.S., and consumer price index for Japan. FL consists of consumer confidence index, NAPM index, housing starts, and index of leading indicators for the U.S., and leading economic index, consumer confidence, TANKAN large manufacturing index, and TANKAN non-manufacturing index for Japan. M consists of target federal funds rate for the U.S., and monetary base for Japan.

relative influence of news by category further illustrates the importance of considering both U.S. and foreign news surprises.

4.1 Robustness of Methodology

The second and third columns of Table 2 display the results of our methodology robustness checks. The second column pertains to the alternative model that includes all the available data of the sample (as opposed to the baseline model which utilizes only the 100-minute windows around the announcements). The third column pertains to the WLS estimation procedure described in the previous section. Comparing the coefficient estimates across the three columns, it is evident that the results obtained using the three different methodologies are practically identical. In other words, our baseline methodology is proven to be very robust.

In order to get a sense of the overall explanatory power of the Japanese news surprises relative to the U.S. news surprises, we estimate Equation (1) separately with only U.S. news variables included and separately with only Japanese news variables included as explanatory variables. Table 3 presents the results. For the model including only the U.S. variables, the same 12 news variables as before are significant and of the correct sign. For the model including only the Japanese variables, the same 6 news variables as before are significant and of the correct sign. In addition, the Japanese news variable Retail Trade is now marginally significant and of the correct sign. More importantly, the R^2 of the model incorporating only U.S. news variables is 11.05% while the R^2 of the model incorporating only Japanese news variables is practically the same at

11.97%.[18] This suggests that, overall, the Japanese macro news are about as influential as the U.S. macro news. Again, our results imply that it is clearly insufficient to focus on only U.S. news when modeling the JPY/USD exchange rate.

5. Extensions

5.1 Asymmetric Responses to Positive and Negative Surprises

As noted earlier, other studies find evidence of an asymmetric response to U.S. news surprises. In particular, negative surprises about the U.S. economy tend to have a greater impact than positive surprises. In this section we analyze whether the same result holds true for Japanese news surprises. In order to do so, we estimate Equation (3), which, as previously noted, is a generalization of our baseline regression that allows positive surprises to have a different coefficient estimate than negative surprises. Table 4 presents the results.

With respect to U.S. news surprises, we confirm the aforementioned finding that negative surprises about the U.S. economy tend to have larger effects than positive U.S. surprises. First, there are more significant coefficients of the expected sign associated with negative U.S. surprises than with positive surprises (11 versus 9). Second, the average absolute effect of a negative U.S. surprise is 0.0403 while the average absolute effect of a positive surprise is 0.0342.

This result does not hold for Japanese news surprises. We find an equal number of significant coefficients of the expected sign associated with negative and positive Japanese surprises (7 of each). Moreover, the average absolute economic impacts of

[18] In order to make the R^2 comparison meaningful, the results displayed in Table 3 are based on time-series estimations that include all sample observations rather than the "windows" approach used for the baseline model estimations displayed in Table 2.

negative and positive Japanese surprises are practically identical (0.0365 for negative Japanese surprises versus 0.0370 for positive ones).

Although positive and negative Japanese news appear similar on average, we find asymmetric effects across positive and negative Japanese news surprises when looking at the various types of Japanese news individually. In fact, the sets of significant coefficients are very different for positive and negative Japanese surprises. While news surprises regarding monetary base and capacity utilization are only significant for positive Japanese surprises, retail trade and consumer price index are only significant for negative Japanese surprises. The asymmetric pattern across individual Japanese news surprises shows the importance of distinguishing between "good" and "bad" news.

5.2 Business Cycle Asymmetries

We investigate possible asymmetric effects of news on the exchange rate across different U.S. and Japanese business cycle combinations.[19] There are, in principle, four possible business cycle combinations coincident for the U.S. and Japan: Japan and U.S. upturn (denoted t_A in Equation 4); Japan and U.S. downturn (denoted t_B in Equation 4); Japan upturn and U.S. downturn (denoted t_C in Equation 4); and Japan downturn and U.S. upturn (denoted t_D in Equation 4).

Table 5 shows the dates for each of the four U.S. and Japan business cycle combinations. There is no part of our sample which encompasses a Japanese upturn

[19] Andersen, Bollerslev, Diebold and Vega (2007) consider the possible asymmetric effects of U.S. news surprises across different stages of the U.S. business cycle. They note that the effects of U.S. macroeconomic news on equities and bonds react differently depending on the state of the U.S. business cycle and, therefore, correlations averaged over the business cycle are typically low. They do not make this observation for exchange rates.

coincident with a U.S. downturn (t_C), i.e. our sample period encompasses only three business cycle combinations.. In addition, we have too few observations (non-zero news surprises) on sample t_B (coincident U.S. and Japan downturn during April 2001 to November 2001) to carry out a meaningful model estimation. We therefore concentrate our investigation of asymmetric effects on the remaining two business cycle combinations of Japan upturn/U.S. upturn (t_A) and Japan downturn/U.S. upturn (t_D).

Table 6 shows the results of the model estimated over the two different Japan-U.S. business cycle combinations, as described by Equation (4). For the Japan upturn/U.S. upturn sub-sample the table shows that 10 of the U.S. news variables and 8 of the Japanese news variables are significant and of the correct sign. Again, the most influential news variables are U.S. non-farm payroll employment, U.S. trade balance, Japanese GDP, and Japanese TANKAN large manufacturing index.

The Japan downturn/U.S. upturn combination results show that only 6 of the U.S. news variables and only 3 of the Japanese news variables are significant and of the correct sign. However, the same four news variables remain the most important. Moreover, the magnitude of the estimated coefficients for each of these four variables is larger than the magnitude of the comparable coefficient estimate based on the full sample analysis described earlier (and displayed in Table 2). With the exception of the Japanese TANKAN large manufacturing index, three of the four most important news variables are also associated with larger coefficient estimates compared to the Japan upturn/U.S. upturn results.

Consequently, we conclude that the JPY/USD exchange rate does indeed respond asymmetrically to macro news depending on the state of the Japanese business cycle.

Specifically, the exchange rate is responsive to a broader set of news when the Japanese economy is in an upturn, yet it is even more responsive to the consistently most important types of news when the Japanese economy is in a downturn. These results illustrate the importance of accounting for differences in the business cycle when assessing the exchange rate effects of macro news surprises.

The advantage of this investigation, and thus the strength of our results on business cycle asymmetries, is that our data facilitates the clean comparison of the intraday JPY/USD exchange rate response to news across both a Japanese business cycle upturn and a Japanese business cycle downturn due to the fact that the U.S. business cycle remains the same, i.e. we vary the state of the Japanese business cycle while holding the state of the U.S. business cycle constant. [20]

6. Conclusion

Existing studies of the intraday JPY/USD exchange rate effects of news have largely ignored the Japanese side of macro news and assessed only the influence of U.S. news. Exceptions, including Cai, Cheung, Lee and Melvin (2001), Clarida and Waldman (2007), Ito and Roley (1987), and Melvin and Yin (2000), do not consider a broad set of comparable Japanese and U.S. news surprises. This constitutes a perhaps surprising omission in the intraday literature on exchange rates and news, especially considering that the Japanese economy is the second-largest economy in the world, Japan has a flexible exchange rate system with open capital markets, and the JPY/USD exchange rate has experienced very substantial fluctuations.

[20] As noted earlier, we do not have the data necessary for testing whether the described variation in exchange rate responses across the Japanese business cycle is contingent on a U.S. business cycle upturn or if our results are applicable regardless of the state of the U.S. economy.

We address this issue by jointly investigating the intraday JPY/USD exchange rate responses to U.S. and Japanese macroeconomic news surprises over the over the 1 January 1999 to 31 October 2006 time-period. Both U.S. and Japanese news surprises are measured as the difference between the macroeconomic announcement and the median value of the immediately preceding Bloomberg News Service survey of market expectations regarding the given announcement.

Our investigation considers three research questions. The first research question is simply whether Japanese news matter for the intraday JPY/USD exchange rate. We show that news surprises from Japan are as influential as those from the U.S. in moving 5-minute JPY/USD exchange rate returns. Specifically, two of the four most influential macro news emanate from Japan. This is important, as it implies that, at least in the case of the intraday JPY/USD exchange rate, focusing on U.S. news while disregarding foreign news misses half the story.

The second research question is whether "good" and "bad" news exert similar intraday effects (in absolute terms) on the exchange rate. We find some evidence of symmetric effects across all positive and all negative Japanese news surprises, contrasting with some evidence of asymmetric effects across all positive and all negative U.S. news surprises. In particular, we find an equal number of significant coefficients of the expected sign associated with negative and positive Japanese surprises, and their average impacts are almost identical. However, we find asymmetric effects across positive and negative surprises of Japanese news when looking at each of the Japanese news individually.

The third and final research question is whether the exchange rate effects of news surprises vary with the different stages of the business cycle. Our data spans a time-period that allows us to assess the effects of news separately across both a Japanese business cycle upturn and a Japanese business cycle downturn while holding the state of the U.S. business cycle constant (at U.S. upturn). Our results show that the intraday JPY/USD exchange rate responds to a broader set of both U.S. and Japanese news when the Japanese economy is in an upturn, yet it is even more responsive to the consistently most important types of both U.S. and Japanese news when the Japanese economy is in a downturn.

In conclusion, Japanese macroeconomic news surprises matter for the intraday JPY/USD exchange rate, as do the direction of news surprises and the state of the Japanese business cycle. Clearly, foreign exchange market participants follow Japanese macro news closely when making their trading decisions.

References

Almeida, Alvaro; Charles Goodhart and Richard Payne (1998): "The Effects of Macroeconomic News on High Frequency Exchange Rate Behavior", Journal of Financial and Quantitative Analysis 33, 383-408.

Andersen, Torben G. and Tim Bollerslev (1998): "Deutsche Mark-Dollar Volatility: Intraday Activity Patterns, Macroeconomic Announcements, and Longer-Run Dependencies", Journal of Finance 53, 219-265.

Andersen, Torben G.; Tim Bollerslev; Francis X. Diebold and Clara Vega (2003): "Micro Effects of Macro Announcements: Real-Time Price Discovery in Foreign Exchange", American Economic Review 93, 38-62.

Andersen, Torben G.; Tim Bollerslev; Francis X. Diebold and Clara Vega (2007): "Real-Time Price Discovery in Global Stock, Bond and Foreign Exchange Markets", Journal of International Economics 73, 251-277.

Bauwens, Luc; Ben Omrane, Walid and Pierre Giot (2005): "News Announcements, Market Activity and Volatility in the Euro/Dollar Foreign Exchange Market", Journal of International Money and Finance 24, 1108-1125.

Bollerslev, Tim and Ian Domowitz (1993): "Trading Patterns and Prices in the Interbank Foreign Exchange Market", Journal of Finance 48, 1421-1443.

Cai, Jun; Yan-Leung Cheung; Raymond S.K. Lee and Michael Melvin (2001): "Once-In-A-Generation' Yen Volatility in 1998: Fundamentals, Intervention, and Order Flow", Journal of International Money and Finance 20, 327-347.

Chaboud, Alain P.; Sergey V. Chernenko; Edward Howorka; Raj S. Krishnasmi Iyer; David Liu and Jonathan H. Wright (2004): "The High-Frequency Effects of U.S. Macroeconomic Data Releases on Prices and Trading Activity in the Global Interdealer Foreign Exchange Market", Board of Governors of the Federal Reserve System, International Finance Discussion Papers No. 823.

Clarida, Richard and Daniel Waldman (2007): "Is Bad News about Inflation Good News for the Exchange Rate?", NBER Working Paper No. 13010.

Dacorogna, Michel M.; Ulrich A. Müller; Robert J. Nagler; Richard B. Olsen and Olivier V. Pictet (1993): "A Geographical Model for the Daily and Weekly Seasonal Volatility in the Foreign Exchange Market", Journal of International Money and Finance 12, 413-438.

Engel, Charles; Nelson C. Mark and Kenneth D. West (2007): "Exchange Rate Models Are Not as Bad as You Think", NBER Working Paper No. 13318.

Fatum, Rasmus and Barry Scholnick (2008): "Monetary Policy News and Exchange Rate Responses: Do Only Surprises Matter?", Journal of Banking and Finance 32, 1076-1086.

Faust, Jon; John H. Rogers; Shing-Yi Wang and Jonathan H. Wright (2005): "The High-Frequency Response of Exchange Rates and Interest Rates to Macroeconomic Announcements", Journal of Monetary Economics 54, 1051-1068.

Goodhart, Charles; Takatoshi Ito and Richard Payne (1996): "One Day in June 1993: A Study of the Working of the Reuters 2000-2 Electronic Foreign Exchange Trading System" in Jeffrey A. Frankel; Giampaolo Galli and Alberto Giovannini, eds., The Microstructure of Foreign Exchange Markets, 107-179. University of Chicago Press, Chicago.

Ito, Takatoshi and V. Vance Roley (1987): "News from the U.S. and Japan. Which Moves the Yen/Dollar Exchange Rate?", Journal of Monetary Economics 19, 255-277.

McQueen, Grant and V. Vance Roley (1993): "Stock Prices, News, and Business Conditions", Review of Financial Studies 6, 683-707.

Meese, Richard A. and Kenneth Rogoff (1983): "Empirical Exchange Rate Models of the Seventies: Are They Fit to Survive?", Journal of International Economics 14, 3-24.

Melvin, Michael and Xixi Yin (2000): "Public Information Arrival, Exchange Rate Volatility, and Quote Frequency," The Economic Journal 110, 644-661.

Table 1: Japanese Macro Surprises

Announcement	Non-Zero Announcement Surprises	Starting Date	Announcement Frequency	Announcement Time (Tokyo Time)
GDP				
GDP Quarterly	39	03/12/99	Quarterly	Irregular
GDP Annually	25	09/17/03	Quarterly	8.50 AM
Real Activity				
Large Retail Sales	78	12/15/99	Monthly	8.50 AM
Industrial Production	116	05/17/00	Monthly	Irregular
Capacity Utilization	53	03/15/02	Monthly	1.30 PM
Consumption				
Overall Spending	7	03/31/06	Monthly	8.50 AM
Investment				
Construction Orders	75	03/01/00	Monthly	2.00 PM
Net exports				
Trade Balance	34	09/12/02	Monthly	8.50 AM
Current Account	79	01/18/99	Monthly	8.50 AM
Retail Trade	60	02/26/01	Monthly	Irregular
Prices				
Consumer Price Index	37	09/28/01	Monthly	Irregular
Forward Looking				
Leading Economic Index	73	12/06/99	Monthly	2.00 PM
Consumer Confidence Index	42	03/23/02	Monthly	Irregular
TANKAN Large Manufacturing	17	12/12/01	Quarterly	8.50 AM
TANKAN Non-Manufacturing	14	04/01/02	Quarterly	Irregular
Monetary Policy				
Monetary Base	45	10/02/02	Monthly	8.50 AM

Notes:

a) Data Sources: Bank of Japan, Japanese Cabinet Office, and Bloomberg News Service

b) Sample period: 1 January 1999 to 31 October 2006

c) While our sample period starts 1 January 1999, some of the announcement series under study are not tracked by Bloomberg News Service and/or data on surveys of market expectations are not available until later in the sample. The starting date denotes when the first announcement and associated survey are available for a given announcement series. The announcement time of an announcement is denoted irregular if the announcement time changes during the sample period.

d) Additional details are available from the authors upon request.

Table 2: Baseline Regression with Three Different Methodologies

	Baseline Methodology		Methodology Check 1		Methodology Check 2	
Sample:	100-min. windows		All sample		100-min. windows	
Estimation Procedure:	OLS with HAC S.E.		OLS with HAC S.E.		WLS	
U.S. Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
GDP	0.0410 ***	(0.0056)	0.0415 ***	(0.0055)	0.0397 ***	(0.0037)
Nonfarm payroll employment	0.1172 ***	(0.0207)	0.1179 ***	(0.0207)	0.1193 ***	(0.0043)
Industrial production	0.0066	(0.0052)	0.0071	(0.0051)	0.0077	(0.0054)
Capacity utilization	0.0122 **	(0.0057)	0.0121 **	(0.0057)	0.0121 *	(0.0069)
Personal income	0.0034	(0.0034)	0.0033	(0.0034)	0.0030	(0.0035)
Consumer credit	-0.0029	(0.0018)	-0.0028	(0.0018)	-0.0024	(0.0036)
Consumer spending	0.0122 ***	(0.0041)	0.0122 ***	(0.0041)	0.0117 ***	(0.0037)
New home sales	0.0103 *	(0.0053)	0.0103 **	(0.0052)	0.0097 ***	(0.0036)
Durable goods orders	0.0235 ***	(0.0064)	0.0241 ***	(0.0065)	0.0237 ***	(0.0038)
Factory orders	0.0036	(0.0056)	0.0043	(0.0056)	0.0039	(0.0038)
Business inventories	-0.0046	(0.0039)	-0.0042	(0.0039)	-0.0043	(0.0037)
Trade balance	0.0739 ***	(0.0109)	0.0741 ***	(0.0107)	0.0716 ***	(0.0045)
Producer price index	0.0094 **	(0.0046)	0.0091 *	(0.0046)	0.0097 ***	(0.0037)
Consumer price index	0.0042	(0.0067)	0.0043	(0.0067)	0.0045	(0.0037)
Consumer confidence index	0.0363 ***	(0.0049)	0.0369 ***	(0.0050)	0.0366 ***	(0.0038)
NAPM index	0.0329 ***	(0.0050)	0.0327 ***	(0.0050)	0.0332 ***	(0.0036)
Housing starts	0.0083 **	(0.0039)	0.0080 **	(0.0039)	0.0094 **	(0.0037)
Index of leading indicators	0.0090 **	(0.0037)	0.0089 **	(0.0036)	0.0093 **	(0.0037)
Target federal funds rate	-0.0009 ***	(0.0001)	-0.0016 ***	(0.0000)	-0.0009	(0.0067)
Japanese Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Trade balance	-0.0053	(0.0038)	-0.0056	(0.0038)	-0.0052	(0.0065)
Current account	-0.0047	(0.0037)	-0.0049	(0.0037)	-0.0048	(0.0042)
Leading economic index	0.0016	(0.0045)	0.0014	(0.0043)	0.0000	(0.0036)
Consumer confidence index	0.0038	(0.0037)	0.0035	(0.0036)	0.0028	(0.0056)
TANKAN large manufacturing index	-0.0611 ***	(0.0176)	-0.0618 ***	(0.0175)	-0.0576 ***	(0.0077)
TANKAN non-manufacturing index	-0.0083	(0.0131)	-0.0085	(0.0131)	-0.0063	(0.0079)
Monetary base	-0.0047	(0.0040)	-0.0043	(0.0038)	-0.0044	(0.0053)
Capacity utilization	-0.0070	(0.0116)	-0.0065	(0.0112)	-0.0038	(0.0135)
GDP (quarterly)	-0.0239 ***	(0.0067)	-0.0235 ***	(0.0065)	-0.0231 ***	(0.0078)
GDP (annual)	-0.0635 ***	(0.0189)	-0.0647 ***	(0.0187)	-0.0639 ***	(0.0105)
Large retail sales	0.0013	(0.0039)	0.0013	(0.0038)	0.0009	(0.0043)
Construction orders	-0.0019	(0.0042)	-0.0019	(0.0040)	-0.0014	(0.0073)
Industrial production	-0.0191 ***	(0.0033)	-0.0186 ***	(0.0032)	-0.0178 ***	(0.0030)
Retail trade	-0.0108	(0.0066)	-0.0099	(0.0064)	-0.0077	(0.0055)
Consumer price index	-0.0087 ***	(0.0029)	-0.0084 ***	(0.0029)	-0.0091 **	(0.0044)
Overall spending	-0.0077 ***	(0.0028)	-0.0069 **	(0.0029)	-0.0078	(0.0117)
R-squared:	11.19%		3.80%		10.48%	
Number of observations:	33,466		611,237		33,466	

Statistics associated with the constant and the first two lags of the dependent variable are omitted for space considerations and are available upon request. Standard errors are given in parenthesis. The symbols *, **, and *** denote that the individual coefficient is significant at the 10%, 5%, and 1% significance level respectively.

Table 3: U.S. Macro Surprises Only and Japanese Macro Surprises Only Regressions

	U.S. Only		Japanese Only	
Sample:	100-min. windows		100-min. windows	
Estimation Procedure:	OLS with HAC S.E.		OLS with HAC S.E.	
U.S. Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**
GDP	0.0411 ***	(0.0056)	-	-
Nonfarm payroll employment	0.1171 ***	(0.0207)	-	-
Industrial production	0.0066	(0.0052)	-	-
Capacity utilization	0.0122 **	(0.0057)	-	-
Personal income	0.0035	(0.0034)	-	-
Consumer credit	-0.0029	(0.0018)	-	-
Consumer spending	0.0122 ***	(0.0041)	-	-
New home sales	0.0104 **	(0.0053)	-	-
Durable goods orders	0.0235 ***	(0.0064)	-	-
Factory orders	0.0037	(0.0056)	-	-
Business inventories	-0.0046	(0.0039)	-	-
Trade balance	0.0739 ***	(0.0109)	-	-
Producer price index	0.0094 **	(0.0046)	-	-
Consumer price index	0.0042	(0.0067)	-	-
Consumer confidence index	0.0363 ***	(0.0049)	-	-
NAPM index	0.0329 ***	(0.0050)	-	-
Housing starts	0.0083 **	(0.0039)	-	-
Index of leading indicators	0.0090 **	(0.0037)	-	-
Target federal funds rate	-0.0010 ***	(0.0001)	-	-
Japanese Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Trade balance	-	-	-0.0052	(0.0038)
Current account	-	-	-0.0049	(0.0037)
Leading economic index	-	-	0.0016	(0.0045)
Consumer confidence index	-	-	0.0039	(0.0037)
TANKAN large manufacturing index	-	-	-0.0611 ***	(0.0175)
TANKAN non-manufacturing index	-	-	-0.0084	(0.0131)
Monetary base	-	-	-0.0046	(0.0041)
Capacity utilization	-	-	-0.0071	(0.0119)
GDP (quarterly)	-	-	-0.0243 ***	(0.0067)
GDP (annual)	-	-	-0.0630 ***	(0.0188)
Large retail sales	-	-	0.0013	(0.0040)
Construction orders	-	-	-0.0017	(0.0043)
Industrial production	-	-	-0.0189 ***	(0.0034)
Retail trade	-	-	-0.0111 *	(0.0066)
Consumer price index	-	-	-0.0089 ***	(0.0029)
Overall spending	-	-	-0.0075 ***	(0.0028)
R-squared:	11.05%		11.97%	
Number of observations:	24,918		8,548	

Statistics associated with the constant and the first two lags of the dependent variable are omitted for space considerations and are available upon request. Standard errors are given in parenthesis. The symbols *, **, and *** denote that the individual coefficient is significant at the 10%, 5%, and 1% significance level respectively.

Table 4: Positive and Negative Macro Surprises

	Postive Surprises		Negative Surprises	
Sample:	100-min. windows			
Estimation Procedure:	OLS with HAC S.E.			
U.S. Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**
GDP	0.0219 ***	(0.0049)	0.0612 ***	(0.0085)
Nonfarm payroll employment	0.1111 ***	(0.0209)	0.1193 ***	(0.0271)
Industrial production	0.0122	(0.0076)	0.0017	(0.0077)
Capacity utilization	0.0093	(0.0086)	0.0154 *	(0.0083)
Personal income	0.0045 *	(0.0025)	0.0008	(0.0107)
Consumer credit	-0.0007	(0.0018)	-0.0055 *	(0.0031)
Consumer spending	0.0081	(0.0052)	0.0176 **	(0.0073)
New home sales	0.0080	(0.0056)	0.0147	(0.0111)
Durable goods orders	0.0153 *	(0.0090)	0.0337 ***	(0.0069)
Factory orders	0.0129 ***	(0.0044)	-0.0063	(0.0101)
Business inventories	-0.0105 *	(0.0054)	0.0022	(0.0057)
Trade balance	0.0633 ***	(0.0103)	0.0794 ***	(0.0153)
Producer price index	0.0049	(0.0049)	0.0154 *	(0.0081)
Consumer price index	-0.0111	(0.0098)	0.0144 *	(0.0078)
Consumer confidence index	0.0377 ***	(0.0071)	0.0345 ***	(0.0068)
NAPM index	0.0326 ***	(0.0076)	0.0330 ***	(0.0073)
Housing starts	0.0026	(0.0048)	0.0196 ***	(0.0054)
Index of leading indicators	0.0083 **	(0.0039)	0.0098	(0.0073)
Target federal funds rate	-0.0009 ***	(0.0001)	-0.0009 ***	(0.0001)
Japanese Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Trade balance	-0.0036	(0.0076)	-0.0056	(0.0042)
Current account	-0.0078	(0.0049)	0.0000	(0.0069)
Leading economic index	0.0055	(0.0049)	-0.0039	(0.0031)
Consumer confidence index	0.0051	(0.0061)	0.0030	(0.0045)
TANKAN large manufacturing index	-0.0591 *	(0.0318)	-0.0694 ***	(0.0231)
TANKAN non-manufacturing index	-0.0058	(0.0295)	-0.0117	(0.0157)
Monetary base	-0.0199 ***	(0.0074)	-0.0020	(0.0044)
Capacity utilization	-0.0196 ***	(0.0058)	0.0082	(0.0181)
GDP (quarterly)	-0.0219 ***	(0.0059)	-0.0317 *	(0.0180)
GDP (annual)	-0.0465 **	(0.0182)	-0.0773 ***	(0.0283)
Large retailers sales	-0.0049	(0.0043)	0.0071	(0.0053)
Construction orders	-0.0032	(0.0047)	-0.0014	(0.0054)
Industrial production	-0.0182 **	(0.0074)	-0.0195 ***	(0.0037)
Retail trade	0.0012	(0.0046)	-0.0398 ***	(0.0135)
Consumer price index	-0.0062	(0.0038)	-0.0108 **	(0.0046)
Overall spending	-0.0735 ***	(0.0197)	-0.0071 **	(0.0028)
R-squared:	11.40%			
Number of observations:	33,466			

Both sets of coefficients are based on the same regression. Standard errors are given in parenthesis. The symbols *, **, and *** denote either that (1) the individual coefficient is significant or (2) the null hypothesis is rejected at the 10%, 5%, and 1% significance level respectively.

Table 5: U.S. and Japanese Business Cycle Combinations

Business Cycle Combination	Japanese Business Cycle	U.S. Business Cycle	Dates
A	Upturn	Upturn	January 1999 to December 2000
	Upturn	Upturn	February 2002 to October 2006
B	Upturn	Downturn	No observations
C	Downturn	Upturn	January 2001 to March 2001
	Downturn	Upturn	December 2001 to January 2002
D	Downturn	Downturn	April 2001 to November 2001

Notes:

a) U.S. business cycle definitions in accordance with the Business Cycle Dating Committee of the National Bureau of Economic Research.

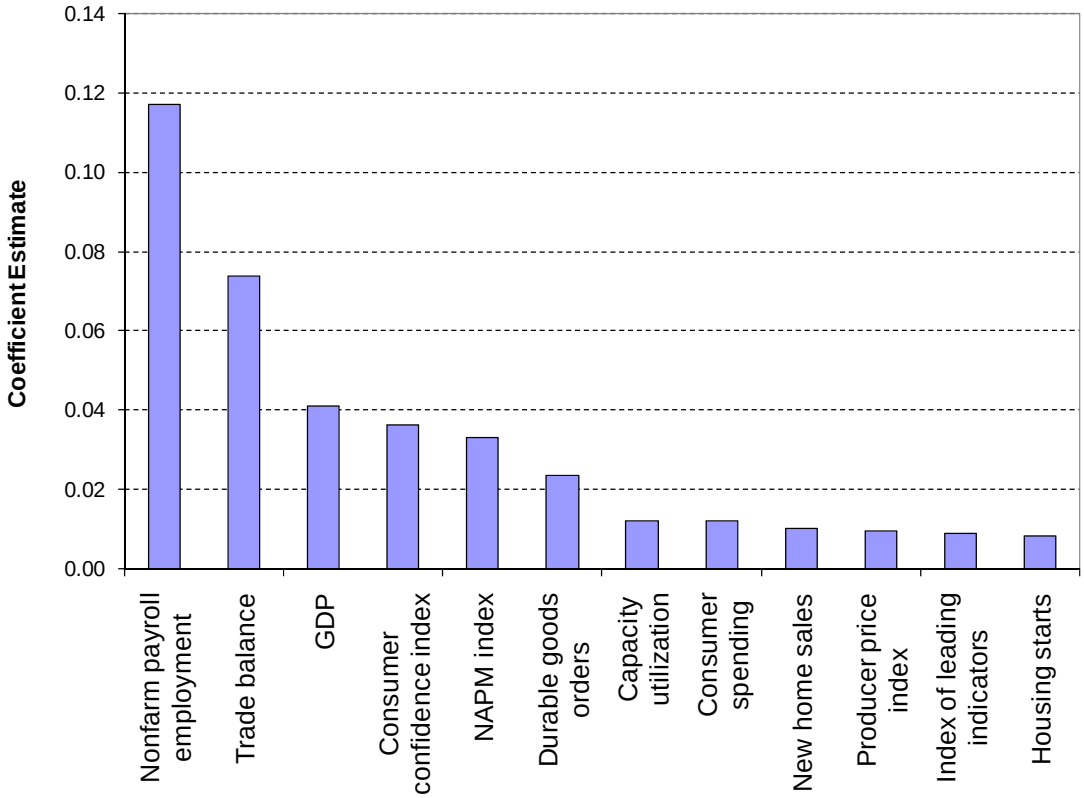
b) Japanese business cycle definitions based on the Japanese industrial production index and the Composite Coincident Business Cycle Index of the Government of Japan Cabinet Office.

Table 6: Business Cycle Effects

	Japan Upturn and U.S. Upturn		Japan Downturn and U.S. Upturn	
Sample:	100-min. windows		100-min. windows	
Estimation Procedure:	OLS with HAC S.E.		OLS with HAC S.E.	
U.S. Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**
GDP	0.0470 ***	(0.0073)	0.0319 ***	(0.0083)
Nonfarm payroll employment	0.1210 ***	(0.0324)	0.1891 ***	(0.0298)
Industrial production	0.0054	(0.0069)	0.0055	(0.0200)
Capacity utilization	0.0117	(0.0082)	0.0190	(0.0162)
Personal income	0.0055 *	(0.0031)	-0.0044	(0.0123)
Consumer credit	-0.0043 *	(0.0026)	-0.0025	(0.0033)
Consumer spending	0.0137 **	(0.0053)	0.0092	(0.0081)
New home sales	0.0114	(0.0075)	0.0028	(0.0063)
Durable goods orders	0.0294 ***	(0.0085)	0.0163	(0.0137)
Factory orders	0.0035	(0.0090)	0.0081	(0.0070)
Business inventories	-0.0053	(0.0050)	-0.0073	(0.0109)
Trade balance	0.0624 ***	(0.0082)	0.0889 ***	(0.0219)
Producer price index	0.0094 *	(0.0052)	0.0042	(0.0114)
Consumer price index	-0.0055	(0.0081)	0.0132	(0.0140)
Consumer confidence index	0.0386 ***	(0.0069)	0.0269 **	(0.0134)
NAPM index	0.0327 ***	(0.0068)	0.0206 **	(0.0086)
Housing starts	0.0090 *	(0.0053)	0.0079	(0.0062)
Index of leading indicators	0.0084	(0.0068)	0.0139 **	(0.0064)
Target federal funds rate	-0.0008 ***	(0.0001)	-	-
Japanese Announcements	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Trade balance	-0.0033	(0.0036)	-0.0178	(0.0118)
Current account	-0.0038	(0.0046)	-0.0111	(0.0076)
Leading economic index	0.0002	(0.0031)	0.0018	(0.0057)
Consumer confidence index	0.0005	(0.0050)	0.0070	(0.0055)
TANKAN large manufacturing index	-0.0981 ***	(0.0327)	-0.0635 ***	(0.0186)
TANKAN non-manufacturing index	-0.0338 **	(0.0133)	0.0247	(0.0247)
Monetary base	-0.0037	(0.0044)	-0.0028	(0.0092)
Capacity utilization	-0.0067	(0.0048)	-0.0077	(0.0148)
GDP (quarterly)	-0.0210 ***	(0.0060)	-0.0223	(0.0144)
GDP (annual)	-0.0430 **	(0.0214)	-0.0835 ***	(0.0272)
Large retail sales	0.0050	(0.0059)	0.0009	(0.0113)
Construction orders	-0.0106 ***	(0.0021)	0.0082 **	(0.0038)
Industrial production	-0.0182 ***	(0.0036)	-0.0236 ***	(0.0084)
Retail trade	-0.0158 *	(0.0082)	0.0064	(0.0084)
Consumer price index	-0.0108 ***	(0.0035)	-0.0014	(0.0035)
Overall spending	-0.0070	(0.0095)	-	-
R-squared:	11.30%		13.11%	
Number of observations:	19,473		8,709	

Statistics associated with the constant and the first two lags of the dependent variable are omitted for space considerations and are available upon request. Standard errors are given in parenthesis. The symbols *, **, and *** denote that the individual coefficient is significant at the 10%, 5%, and 1% significance level respectively.

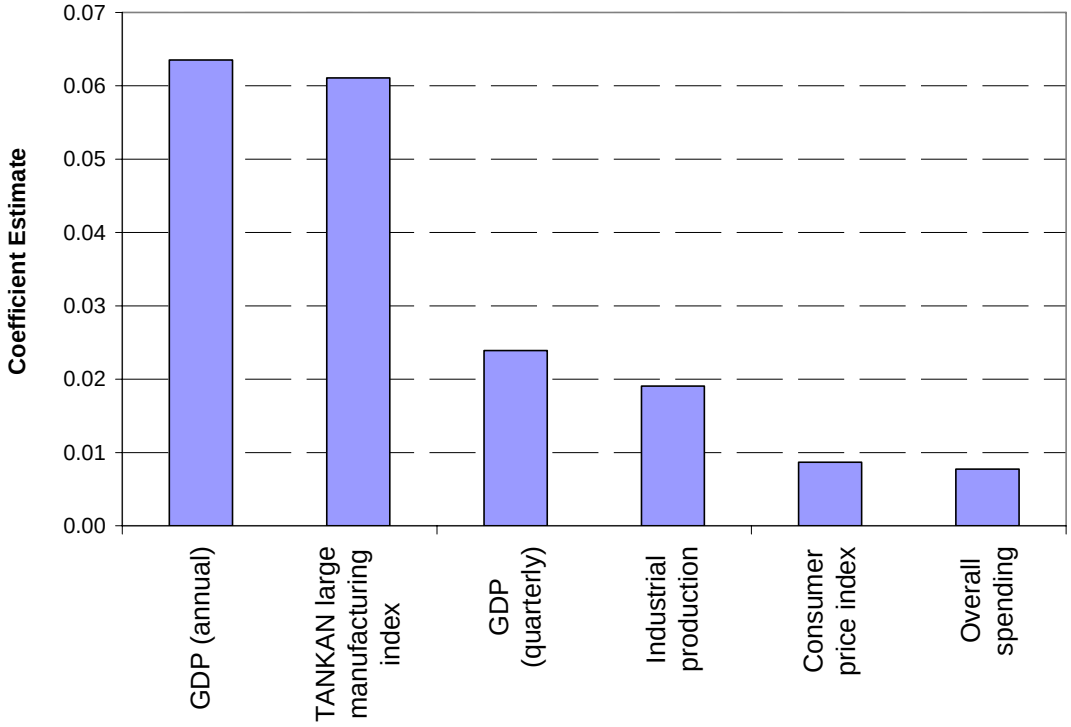
Figure 1: Standardized U.S. Macro Surprises



Notes:

a) The figure displays the significant coefficient estimates of the standardized U.S. macro surprises reported in the first column of Table 2.

Figure 2: Standardized Japanese Macro Surprises

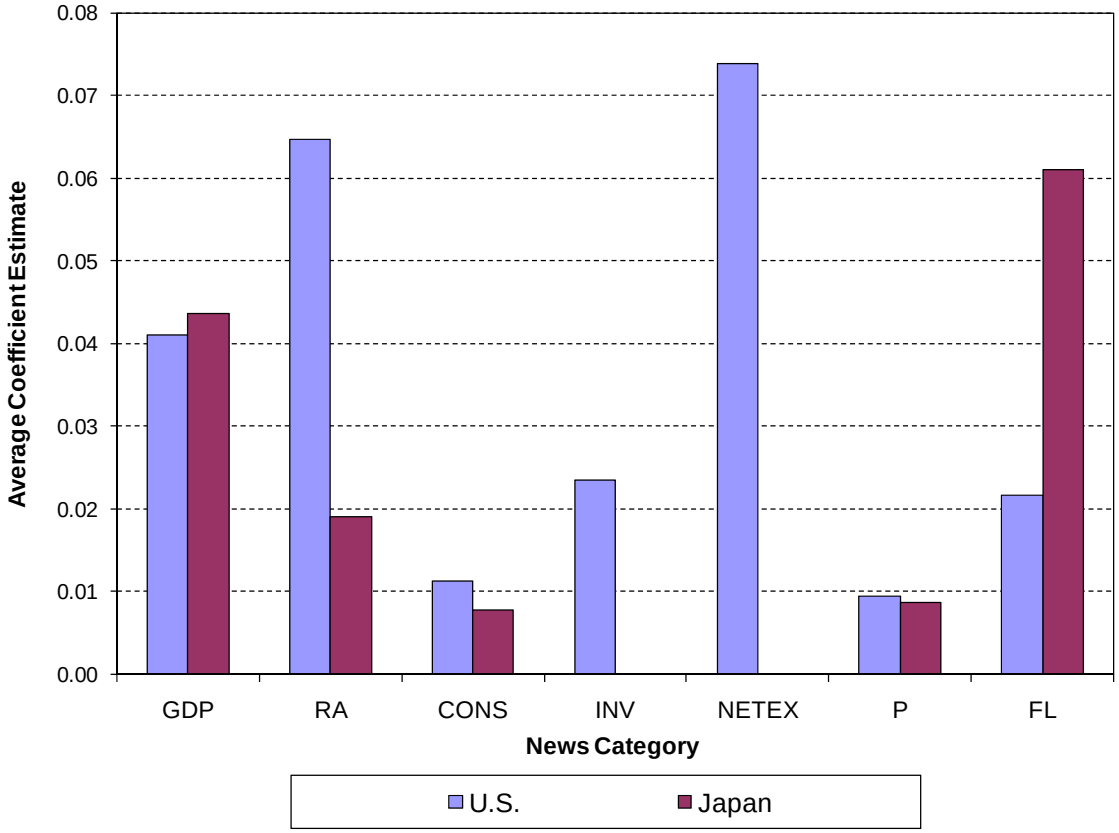


Notes:

a) The figure displays the significant coefficient estimates of the standardized Japanese macro surprises reported in the first column of Table 2.

b) To ease the comparison of the effects of U.S. and Japanese news surprises, the coefficient estimates associated with the Japanese news displayed in Figure 2 are multiplied by negative one.

Figure 3: Average Effect of Macro Surprises by Category



Notes:

a) The average news effect is defined as the simple average of the significant coefficient estimates within each news category.
b) Section 4.1 provides details on the news categories.
c) To ease the comparison of the effects of U.S. and Japanese news surprises, the coefficient estimates associated with the Japanese news displayed in Figure 3 are multiplied by negative one.